

Claims

1. A collision detection system comprising:
a first sensor for sensing an object in a field of view and measuring a first range defined as the distance between the object and the first sensor;

a second sensor for sensing the object in the field of view and measuring a second range defined by the distance between the object and the second sensor; and

a controller for processing the first and second range measurements, said controller further estimating a crossing location of the object as a function of the first and second range measurements.

2. The collision detection system as defined in claim 1, wherein the crossing location is estimated relative to a location midway between the first and second sensors.

3. The collision detection system as defined in claim 1, wherein the first sensor further determines a first range rate and the second sensor further determines a second range rate, wherein the controller estimates the crossing location of the object further as a function of the first and second range rate measurements.

4. The collision detection system as defined in claim 3, wherein the controller computes a mathematical square of the range and computes a mathematical square of the product of range and range rate for each of the plurality of measurements for each of the first and second sensors, said controller further generating a first curve based on the computations of the plurality of measurements sensed by the first sensor and a second curve based on the computations of the plurality of measurements sensed by the second sensor, said controller estimating the crossing location of the object as a function of the first and second curves.

5. The collision detection system as defined in claim 4, wherein the crossing location of the object is estimated as a function of the distance between the first and second curves.

6. The collision detection system as defined in claim 5, wherein the crossing location relative to a location midway between the first and second sensors is estimated by dividing the distance by twice the separation distance of the first and second sensors.

7. The collision detection system as defined in claim 1, wherein the controller computes a mathematical square of range estimates for each of the first and second sensors, computes a difference of the squares, and estimates the crossing location as a function of the computed difference of the squares.

8. The collision detection system as defined in claim 1, wherein the controller further divides the difference of the squares by twice the separation distance between the first and second sensors to estimate the crossing location relative to a location midway between the first and second sensors.

9. The collision detection system as defined in claim 7, wherein the controller comprises a tracking filter.

10. The collision detection system as defined in claim 1, wherein the collision detection system is employed on a vehicle and estimates the crossing location of an object relative to the vehicle.

11. The collision detection system as defined in claim 1, wherein the controller further generates a collision output signal as a function of the estimated crossing location of the object.

12. The collision detection system as defined in claim 1, wherein the first and second sensors each comprises a radar sensor.

13. The collision detection system as defined in claim 1, wherein the controller estimates the crossing location of the object absent an azimuth angle measurement of the object.

14. A method of estimating a crossing location of an object, said method comprising the steps of:

sensing the presence of an object in a field of view;

tracking the object with first and second sensors;

measuring range to the object with the first sensor;

measuring range to the object with the second sensor, wherein the first and second sensors are separate from each other; and

estimating a crossing location of the object as a function of the range measurements from the first and second sensors.

15. The method as defined in claim 14, wherein the crossing location is estimated relative to a location midway between the first and second sensors.

16. The method as defined in claim 14 further comprising the step of determining a first range rate of the object with the first sensor, and determining a second range rate of the object with the second sensor, wherein the crossing location of the object is estimated further as a function of the first and second range rate measurements.

17. The method as defined in claim 16 further comprising the steps of:

computing a mathematical square of range and a mathematical square of the product of range and range rate for each of the plurality of

measurements taken with the first sensor and generating a first curve as a function thereof;

computing a mathematical square of range and a mathematical square of the product of range and range rate for each of the plurality of measurements taken by the second sensor and generating a second curve as a function thereof; and

estimating the crossing location of the object as a function of the first and second curves.

18. The method as defined in claim 17, wherein the step of estimating the crossing location of the object as a function of the first and second curves comprises computing the distance between the first and second curves and dividing the distance by twice the separation distance of the first and second sensors to estimate the crossing location relative to a location midway between the first and second sensors.

19. The method as defined in claim 14, wherein the step of estimating the crossing location of the object comprises the steps of:

computing the mathematical square of each of the range measurements;

computing the difference between the squares for each of the first and second sensors; and

estimating the crossing location as a function of the computed difference.

20. The method as defined in claim 19 further comprising the step of dividing the difference between the squares by twice the separation distance of the first and second sensors to generate the crossing location of the object relative to a location midway between the first and second sensors.

21. The method as defined in claim 14, wherein the method estimates the crossing location of the object relative to a vehicle.

22. The method as defined in claim 22 further comprising the step of generating a collision output signal as a function of the estimated crossing location.